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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTONGRASSHOPPERS OF THE TRIBE OMMEXECHINI:
A KEY TO GENERA, A NEW ARGENTINE
GENUS, AND NOTES ON OTHERS
(ORTHOPTERA, ACRIDIDAE)

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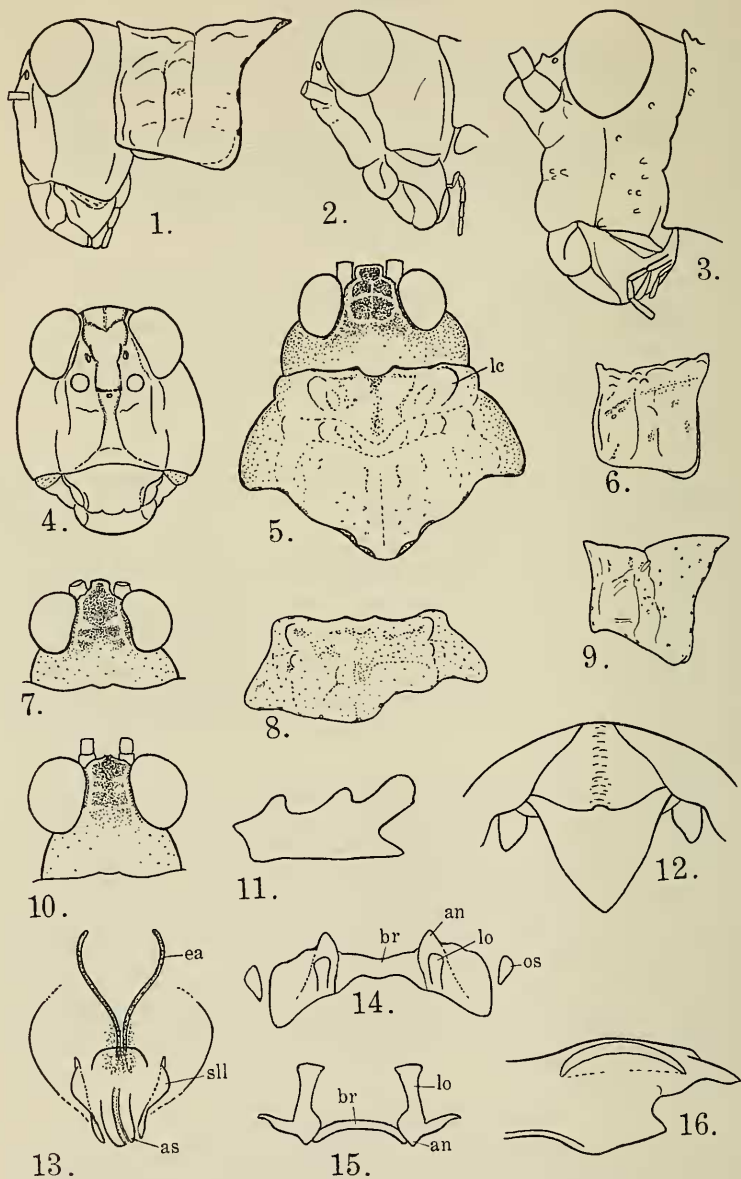
In order to compare a new genus with other genera of the Ommexechini, we have prepared a key to the seven genera now included in the tribe. The last previous key, by Bruner (1911: 38), was to the four genera included in the group at that time. In literature, several tribal characters of the Ommexechini have been confused by different interpretations, and explanations to clarify these interpretations have been given here. Brief notes on the species of each genus are given also, and two new synonymies are indicated, one in *Spathalium*, the other in *Graea*.

This tribe, recently discussed by Eades (1961) and Dirsh (1961), includes about 32 known species. The species are found in South America, in the area from Colombia to Argentina.

Grateful acknowledgments are due James A. G. Rehn and Robert L. Randell, Academy of Natural Sciences of Philadelphia, for their cooperation in loaning material, and for hospitality and technical assistance during our visit to the Academy. David C. Eades of State University College, Oneonta, N. Y., has read the manuscript.

Tetrixocephalus, new genus

Generic description: General form much like *Calcitrena*. Head with interocular distance on vertex about equal to width of one eye in dorsal view; eyes of moderate size; lateral carinae bordering fastigium strongly developed; disk of fastigium deeply (male) to moderately (female) sul-



cate, strongly declivant ventroanteriorly, narrowing to and merging with frontal costa opposite lateral ocelli; frontal costa with transverse carina just dorsad from median ocellus, this carina the maximum anterior development of a weak projection of costa between antennae when seen in lateral view, shallowly sulcate ventrad from ocellus, flaring toward clypeus; width of head in frontal view across genae much greater than across eyes.

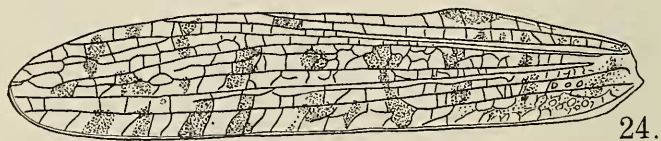
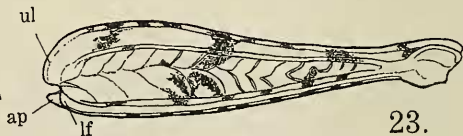
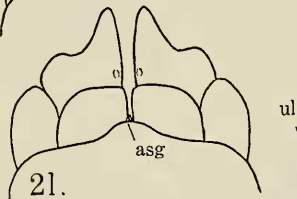
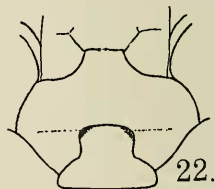
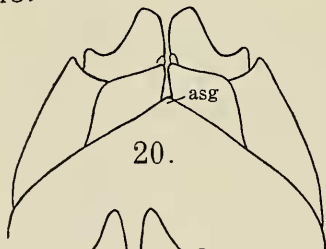
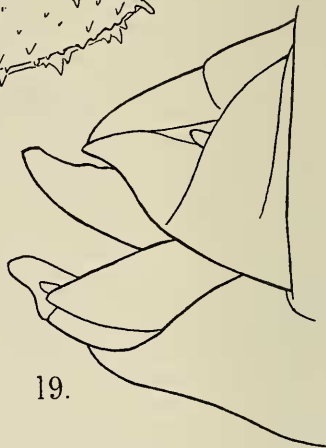
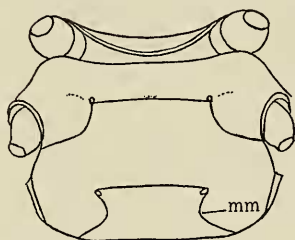
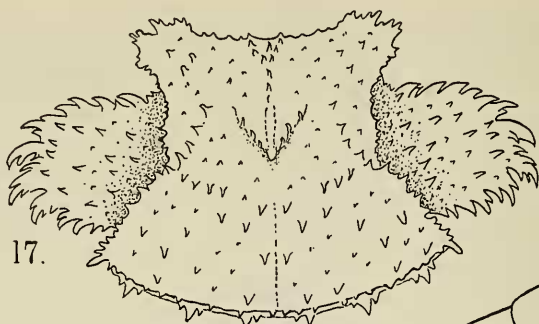
Pronotum about two-thirds as long as total width (female), shorter (male); median carina indistinct, represented by irregular rugosities on prozona, a faint line on metazona; indefinite lateral carinae, indicated by rounded boss on prozona (Fig. 5, *lc*); anterior margin narrowly emarginate mesally, remainder weakly sinuate; posterior margin obtuse-angulate (female), broadly and somewhat irregularly rounded (?) (male); lateral lobes moderately flaring, ventral margin entire, somewhat more produced ventrally toward posterior margin; disk with low rugosities of larger size on prozona than metazona; disk and lateral shoulders cut by two transverse sulci, anterior one extending far posterior at median line of disk, principal sulcus moderately and broadly curved posteriorly (female), sulci indistinct on disk (male); prosternum with transverse, ventrally very broadly curved carina, no trace of prosternal spine; mesosternal interspace about 4 times as wide as long, lateral lobes wider than long; metasternal interspace a little narrower than mesosternal one, lateral lobes with mesal margins angular (Fig. 18, *mm*); tegmina and wings fully developed; front and middle legs moderately slender, unspecialized; hind femur about 4 times as long as wide, simple, upper basal lobe distinctly longer than lower basal lobe so far as main outer faces are concerned, but of subequal length regarding basal attachment lobe, genicular lobes unarmed, carinae of femur with sparse short setae arising directly from cuticle (rather than from tubercles as in *Calcitrena*), Brunner's organ present; hind tibia slender, a little shorter than femur, with fairly numerous short setae, inner marginal spines 10, outer ones 7 to 9, usually 7, an apical spine on inner margin only, two inner and two outer apical spurs, inner ones much longer and about equal to basal tarsomere; tarsomeres slender, the basal one nearly 3 times length of second; claws simple; arolium very small and narrow.

FIGS. 1-16. Figs. 1, 4-8, 11-15: *Tetrixocephalis willemsei*, n. sp. 1, Lateral view of head and pronotum, allotype; 4, Front view of head, same; 5, Dorsal view of head and pronotum, same (*lc*—lateral carina); 6, Lateral view of pronotum, holotype; 7, Dorsal view of head, same; 8, Dorsal view of pronotum, same; 11, Basal tarsomere, right middle leg, female paratype; 12, Dorsal view of supra-anal plate and associated structures, holotype; 13, Dorsal view of phallic complex, epiphallus removed, holotype; 14, Dorsal view of epiphallus, holotype; 15, Front view of epiphallus, holotype.

Figs. 2, 9, 10: *Calcitrena maculosa* Eades. 2, Lateral view of head, holotype; 9, Lateral view of pronotum, allotype; 10, Dorsal view of head, holotype.

Figs. 3, 16: *Ommexecha brunneri* Bolivar. 3, Lateral view of head, male from Huadquina, Peru; 16, Lateral view of apical portion of left hind femur, male from Torontoy, Peru.

(Parts of copulatory organs: *an*—ancora; *as*—aedeagal sclerite; *br*—bridge; *ea*—endophallic apodeme; *lo*—lophus; *os*—oval sclerite; *sl*—sclerite of lateral lobe.)



Abdomen with tympanum apparently absent; no stridulatory mechanism on hind femur, abdomen, or tegmen; male with last apparent tergum deeply emarginate; supra-anal plate also typical of tribe, with prominent transverse carina; cercus small, unspecialized; subgenital plate blunt, simple; female supra-anal plate with weak transverse carina; subgenital plate obtusely angulate at apex; ovipositor valves short, blunt; cerci minute.

Concealed male genitalia described under the species, typical of tribe, comparable to, but differing in details from those of *Calcitrena*.

Type of genus: Tetrixocephalus willemsei, new species.

Tetrixocephalus resembles *Calcitrena* much more than any other genus, and the main differences between the two genera are given in the key. When seen in dorsal view, the frontal costa shows as an anterior projection in advance of the fastigium; the costa does not appear in the male of *Calcitrena* unless the head is viewed from a more anterior position, and in the female of *Calcitrena* the frontal costa in dorsal view is less conspicuous than in *Tetrixocephalus*. In lateral view, the upper margin of the eyes is considerably above the pronotum in the male of *Calcitrena* (Fig. 2), but in the male of *Tetrixocephalus* the upper margin is only moderately above the pronotum (Fig. 1). Differences between females, in this respect, are less decided, but are significant.

Direct comparison of the male genitalia of the two type species shows: 1. Lophi of *Calcitrena* are shorter, with the apices directed mesally more acutely; 2. Endophallic apodemes (Fig. 13. *ea*) of *Tetrixocephalus* are more recurved at their anterior ends; 3. Sclerites of lateral lobes (Fig. 13, *sll*) are proportionately larger in *Calcitrena*. (See Eades (1961: 169) for figures of *Calcitrena*.)

The name *Tetrixocephalus* is chosen because of the superficial resemblance of the head in frontal view to that of many Tetrigidae.

***Tetrixocephalus willemsei*, new species**

(Figs. 1, 4-8, 11-15, 18-20, 23, 24)

Holotype: Male. Laguna Blanca, Neuquen, Argentina, 1300 meters

Figs. 17-24. Fig. 17: *Graea horrida* (Philippi). Dorsal view of pronotum, male from Argentina.

Figs. 18-20, 23, 24: *Tetrixocephalus willemsei*, n. sp. 18, Ventral view of sternal plates, holotype (*mm*—mesal margin of lateral lobe); 19, Lateral view of apical portion of abdomen, female paratype; 20, Ventral view of apical portion of abdomen, female paratype (*asg*—apex of subgenital plate); 23, Lateral view of left hind femur, holotype (*ap*—attachment portion of lower lobe; *lf*—lateral face of lateral lobe; *ul*—upper lobe); 24, Left tegmen, holotype.

Fig. 21: *Calcitrena maculosa* Eades. Ventral view of apical portion of abdomen, allotype.

Fig. 22: *Parossa bimaculata* (Giglio-Tos). Ventral view of sternal plates, male from Sapucay, Paraguay.

(Fig. 23 drawn by Miss Barbara Hartke of the Entomology Research Division; others by the senior author.)

elev., March 1959 (M. Gentili). [U. S. National Museum, Type No. 66392.]

General form very small for tribe; broad across posterior part of prothorax, appendages slender and delicate; tegmen slightly surpassing hind femur, about one-fourth of tegmen length extending posterior to apex of abdomen; no conspicuous vestiture, but sparse short hairs on legs and lower parts of head and pleura.

Head with ratio of total width across dorsum of eyes and narrowest dorsal interocular width 3:1; width across eyes in front view compared to width across genae as 20:22; lateral carinae bordering fastigium extending posteriorly slightly more than one-half eye length; occiput with depressions behind carinae, otherwise only feebly rugose; carinae irregularly constricted just above lateral ocelli; lateral facial carina conspicuous, extending from eye near lateral ocellus to about halfway between antennal base and clypeal suture; genal suture interrupted a short way below eye; (antennae lost); front of head with smooth low rugosities.

Pronotum (Fig. 8) with right side shorter than left, apparently due to injury; principal transverse sulcus only broadly indicated on disk, anterior sulcus cutting lateral shoulders and weakly represented on disk; lateral lobe with ventroposterior corner (Fig. 6) with more prominent rounded marginal area than in female (Fig. 1); sternal interspaces and lobes as in Fig. 18; tegmen (Fig. 24) with 7 distinct longitudinal veins at mid-length, several intercalary veins, cross veins numerous; (front legs lost); middle femur 8.5 times as long as wide; middle tibia with 4 spines each side; basal tarsomere of middle leg with prominent pulvilli (Fig. 11); hind femur as in Fig. 23; pulvilli as described for *Calcitrena*.

Abdomen without evident specialization; supra-anal plate and adjacent structures as in Fig. 12. Concealed genitalia: Aedeagal sclerites (Fig. 13, *as*) closely appressed; outline of lateral lobes (*sll*) only partially distinct in available preparation, but apparently differing from constricted form in *Calcitrena*; endophallic apodemes (*ea*) conspicuous and dorsally recurved at anterior ends. Epiphallus with bridge (Fig. 14, *br*) narrow and sinuate; ancorae part of separate lateral plates, blunt, scarcely downcurved or hooklike; lophi erect, narrow, the distal end not so acute as in *Calcitrena*; small oval sclerites (*os*) present.

Coloration: Background of head, pronotum, and tegmina light gray, with weak overtones of pale brown, of hind femur and ventral surface of abdomen pale clay yellow; sternum of thorax whitish gray; head with very few small blotches of brownish black, such blotches on pronotum sparse along anterior and posterior margins, as well as disk and lateral lobes; blotches on tegmen and lateral surface of hind femur as in Figs. 24 and 23; wing membrane transparent, veins pale brown; front surface of middle femur with three broken dark bands on light gray background; tibia and tarsus dark spotted; hind tibia dirty gray with sparse brown spots, mainly short rectangular spots most numerous in basal half of lateral surface; dorsum of abdomen shiny blackish brown, dark area reduced to

small median and lateral spots toward apical segments; supra-anal plate pale.

Measurements: Length of body, 10.0 mm; median length of pronotum, 1.5; maximum width of pronotum, 3.5; length of tegmen, 9.2; of hind femur, 6.5; max. width of hind femur, 1.5; length of hind tibia, 6.0.

Allotype: Female, same data as holotype [U. S. National Museum]. Differing from holotype as follows: General build more robust; eyes a little less bulging; interocular distance at vertex slightly less than width of an eye (as 7:8); width across eyes in front view compared with width across genae as 22:27; fastigium and interantennal portion of frontal costa broadly sulcate instead of deeply so; pronotum (Fig. 5) with disk more elongate, the two transverse sulci distinct; ovipositor and associated structures as in Figs. 19 and 20 (from paratype).

Coloration: Agrees well with holotype except that background color scarcely includes brown; it is a purer gray.

Measurements: Length of body, 12.4 mm; length of pronotum, 2.6; maximum width of pronotum, 4.2; (apex of tegmen broken); length of hind femur, 7.6; maximum width of hind femur, 1.7; length of hind tibia, 7.2.

Variation: An undamaged tegmen of a female paratype extends 1.5 mm beyond the apex of abdomen and 1 mm beyond the apex of hind femur. Color of the two paratypes agrees better with the holotype than the allotype. Measurements of paratypes (2 ♀♀) are: Length of body, 12.0, 14.5 mm; length of pronotum, 2.4, 2.8; maximum width of pronotum, 3.9, 4.5; length of tegmen, 12.0; length of hind femur, 7.6, 8.3; width of hind femur, 1.7, 1.8; length of hind tibia, 7.3, 7.5.

Because of the deformed male pronotum, it is uncertain how the posterior pronotal margin of perfect males compares with that of the female.

Specimens examined: 4 (holotype, allotype, 2 ♀ paratypes, all with same data). One paratype is deposited in the Instituto de Patología Vegetal, Buenos Aires; the other is in the Academy of Natural Sciences of Philadelphia. The specimens noted by Liebermann (1944: 301) as having been taken at Tejas Verdes, Chile, and then thought to be a new genus, probably are *willemsei*, but they are not available now for examination.

The type locality, Laguna Blanca, is shown in the TIMES ATLAS (John Bartholomew, ed., 1957, vol. 5, plate 119), is located about 40 km west of Zapala, in the western part of Neuquen Province. This is some 1000 km south of La Rioja Province, type locality of *Calcitrena maculosa*. The habitat, like that of *Calcitrena*, *Graea*, and *Spathalium*, is an arid zone with hot sandy hills characterized by volcanic rocks and shrubby vegetation. The area is part of the Patagonian Desert.

This grasshopper is named for our late friend, Dr. C. J. M. Willemse (1889-1962), of Eysgelshoven, The Netherlands, a devoted student of Orthoptera, notably the Acridoidea of Southeastern Asia.

COMMENTS ON TRIBAL CHARACTERS

Dirsh (1961) considered the Ommexechini, as defined by Eades (1961), to represent a distinct family, the Ommexechidae, because he felt family rank was in keeping with the overall classification of the Acridoidea. We accept Eades' definition, and treat the group as a tribe, since we are inclined toward a more conservative course in raising the ranks of taxonomic groups until more comparative studies have been made.

It was stated by Dirsh (l.c., p. 384) that, as a group character, the lower basal lobe of the hind femur, in the Ommexechini, is as long as, or slightly longer than, the upper basal lobe. On the other hand, Eades (l.c., p. 162) stated that the upper basal lobe is at least as long as the basal one, and he described *Calcitrena* (p. 170) as having the upper basal lobe distinctly longer than the lower one. It is evident that Eades utilized the lateral face of the lower lobe adjacent to the paginal area, but Dirsh included the extreme basal portion of the lower lobe which is attached to the trochanter. As an example, the lateral face of the lower lobe in *Tetrixocephalus* (Fig. 23, *lf*) is much shorter than the upper lobe (*ul*), but when the attachment portion of the lower lobe (*ap*) is considered, the lobes are of subequal length. Thus, Eades and Dirsh have referred to different structures and, when we realize that, their apparent disagreement is explained.

Tetrixocephalus has definite but rather blunt ancorae (Fig. 14, *an*). By the definitions of Roberts (1941: 241) and Dirsh (1956: 229), ancorae are hooklike structures which project from the anterior margin of the dorsal surface of the epiphallus. In *T. willemsei* the ancorae are part of the lateral plates of the epiphallus, the plates being lightly joined to the median portion, the bridge. In various other Acridoidea the bridge may be solidly joined to the lateral plates and the ancorae borne sometimes by the bridge portion, or by the lateral plates. Frequently, ancorae are distinct, fingerlike appendages arising from the dorsal surface well back from the anterior margin of the epiphallus; in other cases they are projections of the margin itself. The ancorae in *Tetrixocephalus* are more conspicuous than drawn for *Calcitrena* (Eades, l.c., fig. 15), where they are merely the rounded mesoanterior corners of the lateral plates, though structurally they are the same in both genera, and their presence requires a modification of the diagnosis of the Ommexechini which, according to Dirsh (1961: 384), have no ancorae.

Another character ascribed by Dirsh (l.c., p. 381) is a prosternal spine (or process), and Eades (l.c., p. 168) has stated that a spine may occur or be represented by a slight swelling of a carina. In *Tetrixocephalus* (Fig. 18) there is a strong, broadly curved transverse carina, but no indication of a spine, so within the tribe there is a gradation from a well-developed spine to none at all.

COMMENTS ON THE OTHER GENERA OF OMMEXECHINI

Calcitrena Eades.—This genus and its single species, *maculosa* Eades, was described in 1961 from La Rioja Province, Argentina. Only two adults

and a nymph are known. We have compared the genus with *Tetrixcephalus* under our description of the latter.

Parossa Bruner.—This genus has been reviewed, with a key to species, by Rehn (1941). The five species occur in southern Brazil, Paraguay, eastern Bolivia, and as far south as Mendoza in west-central Argentina.

Pachyossa Rehn.—No specimens of *Pachyossa* have been reported in literature since Rehn's original generic description (1913b: 324) and that of the only species, *signata*, based on a unique female taken in Misiones, Argentina. Recently, important material of the genus has been found in Uruguay by C. S. Carbonell of the Universidad de la República Uruguay and his associates, and a further publication is expected.

Ommexecha Serville.—There are nine species of *Ommexecha*, including *apolinari* Hebard (1923: 218) from Colombia and *walkeri* Kevan (1959: 161, footnote) from Santarem, Brazil, in addition to the seven species documented by Liebermann (1939: 164–165). *O. walkeri* is a replacement name for the preoccupied *O. gracilis* Walker (1870: 798). The genus occurs from Colombia to eastern Argentina (Entre Rios and Santa Fe), where specimens occur on sandy soils.

Spathalium I Bolivar.—Except for *S. paranense* Rehn (1913a: 86–88, figs. 3–4) from Paraná, Brazil, the 13 known species of *Spathalium* were enumerated by Liebermann (1938). The genus extends from central Brazil to central Argentina (La Pampa). We consider *S. Rehni* Liebermann a synonym of *S. viridis* Bruner (New synonymy).

Graea Philippi.—A single species, *horrida* Philippi, is known, though a second, *monstrosa*, was described by Bruner (1900: 52). The drawing of *monstrosa* by Bruner (1900, fig. 20) is the same one for which he later used the name *horrida* (1906, pl. 37, fig. 1). Liebermann (1942: 438) discussed the variation shown by *horrida* and questioned the distinctness of *monstrosa*. The type of *monstrosa*, loaned by the University of Nebraska, was examined in 1962 (by Liebermann) and found to be *horrida* (New synonymy). The distribution of the species is centered in north-western Argentina, especially the arid zones of San Luis, Mendoza, Cordoba, and La Pampa.

KEY TO THE GENERA OF OMMEXECHINI

1. Color green, often tinged with yellow, frequently with orange spots at bases of tegmina which may be concealed by pronotum; mesosternal interspace quadrate or but little wider than long (Fig. 22); hind femur simple, not adorned by lobes, tubercles, or spines; pronotum without a pronounced flare of lateral lobes and not ornate *Parossa* Bruner
- Color usually brown or gray, if green differing in other characters from above; mesosternal interspace much wider than long; hind femur variable, often lobate, tuberculate, or with spines projecting posteriorly from genicular lobes; pronotum frequently flared and very ornate 2

2. Tegmina and wings absent; metanotum and several abdominal terga each with a pronounced spinelike hook or tubercle on midline; lateral lobes of pronotum very flared and ornate (Fig. 17), but posterior margin of pronotum broadly rounded and tuberculate *Graea* Philippi
- Tegmina and wings present; no hooks or tubercles on midline of metanotum or abdomen; lateral lobes of pronotum variable; if degree of *flare* approaches condition shown in Fig. 17, then posterior margin of pronotum usually is very ornate 3
3. Frontal costa but little produced between antennae (Figs. 1, 2); pronotum with median carina absent or weakly indicated on metanotum only, pronotal surface rugose but tubercles scattered and inconspicuously low; tegmina of gray to buff color with numerous well-scattered dark blotches (Fig. 24); size small, pronotal length not exceeding 4 mm 4
- Frontal costa conspicuously produced between antennae (Fig. 3) or, if not (*Pachyossa*), tubercles on pronotum are numerous and strongly developed; pronotum variable, median carina present on prozona, frequently crestlike or, if not, then strong tubercles occur; tegmina of uniform color, streaked, or spotted, but not spotted as in Fig. 24 above; size variable, pronotum often much longer than 4 mm 5
4. Lateral lobe of pronotum with ventral margin conspicuously oblique (Fig. 9); male with anterior surface of head decidedly oblique (Fig. 2); male with interocular area narrower than width of an eye in dorsal view (Fig. 10); female with apex of subgenital plate broadly rounded (Fig. 21, *asg*)
..... *Calcitrena* Eades
- Lateral lobe of pronotum with ventral margin moderately oblique (Figs. 1, 6); male with anterior surface of head not oblique; male with interocular area about equal to width of an eye (Fig. 7); female with apex of subgenital plate angulate (Fig. 20)
..... *Tetrixocephalus*, new genus
5. Flagellum of antenna flattened on dorsal surface, especially on basal half; prozona of pronotum with a crestlike development of median carina, though some species have the crest restricted to scattered hooklike lobes *Spathalum* Bolivar
- Flagellum of antenna not flattened; prozona of pronotum with median carina absent or poorly developed, may be represented by tubercles which are not hooklike or in form of crest 6
6. Projection of frontal costa between antennae moderate; genicular lobes of hind femur without spinelike projections; pronotum rather uniformly covered with low rounded tubercles, without spinelike tubercles or angular corners at lateroposterior angles of lateral lobes, posterior margin of dorsal surface broadly rounded and may be strongly tuberculate *Pachyossa* Rehn

Projection of frontal costa between antennae conspicuous (Fig. 3); genicular lobes of hind femur often (in most species) with spine-like posterior projections extending posteriorly (Fig. 16); pronotum usually with some sharp and conspicuous tubercles instead of a uniform covering of them, lateroposterior angles of lateral lobes angulate or with sharp spine-like tubercles, posterior margin usually angulate or with tubercles creating that appearance *Ommexecha* Serville

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NOTE: Too late for full correction of the names, we have learned that Rosas Costa (*Neotropica*, 8: 79-80, 1962) reported that *Parossa* Bruner 1911 and the preoccupied *Ossa* Giglio-Tos 1894, which it replaced, are synonyms of *Clarazella* Pictet & Saussure 1887, and that *P. viridis* G.-T. 1897 is a synonym of *C. patagona* P. & S. All the species referred to *Parossa* by Rehn (1941) were referred to *Clarazella* by Rosas Costa.